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Data Migration from Operating EMRs to OpenEMR with Mirth Connect

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Abstract. Electronic medical records (EMR) are integral to the functionality of day to day operations in a clinic. EMRs perform functions like scheduling or hosting medical records used by physicians and other staff [1]. A certain time comes when it is necessary to upgrade or change EMRs to maintain efficiency in a clinic. The most arduous part of changing a clinic's EMR is migrating the clinical data from the old EMR to the new. This paper explores the feasibility of data migration between two Electronic Medical Records using open source technologies. This enables smaller clinics to change EMRs when the need arises without incurring huge costs. Using Mirth Connect as a data integration engine and OpenEMR as the new EMR we successfully migrated data from our old EMR to OpenEMR.

Keywords. EMR, data migration, Mirth Connect, OpenEMR

1. Introduction

For decades, physicians have primarily relied on their own judgement when making treatment decisions. Over the years the transition to clinical decision support systems has been aided by the development of various electronic medical records. Usage of electronic medical records has been rising with the 2014 National Physician Online Survey reporting that 75% of Canadian physicians are using electronic medical records [2]. A clinic's requirements can change over time and the EMR used will need to evolve to those changing needs. As new electronic medical records are being developed with more novel technologies, doctors have the opportunity to take advantage of these new systems. However, upgrading or switching EMRs provides a challenge. Migrating all the clinical data from an old EMR to a new EMR can prove very costly.

We wanted to know if there was an alternative to large commercial EMRs for small clinics and if there was a way to migrate data from the old EMR to the new one using easily available technologies. We can take advantage of open source software to construct a solution that will enable a clinic to migrate all of their data should they need to change EMRs.

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2. Methods and Materials

2.1. Data Communication Standards

In order to successfully to connect two EMRs, the messages between the two must be standardized. A combination of Health Level 7 Version 2.x (HL7v2) and custom XML allows for a flexible structure in which data is shared.

HL7v2 is an international communication standard that enables the sharing of electronic health information [3]. It dictates both the semantic standards of clinical data in a message as well as the packaging of said message.

Custom XML formats allow for alternative data points that don't otherwise fall within the HL7v2 standards to be transmitted.

2.2. Communication Server

Mirth Connect Version 3.x is a cross platform health care integration engine [4]. It utilizes a channel based architecture to connect systems and allows messages to be filtered, routed or transformed based on user defined rules.

A Mirth Connect channel consists of four parts: the source connector, filter, transformer, and destination connector [5]. The source connector is responsible for receiving raw messages from the source system and transmitting encoded messages to the destination system, which the destination connector receives. The filter is used to determine whether a message will proceed to through the channel while the transformer can then modify the message. Message modification can range from changing certain fields to changing data types or even the structure of the inbound message. Figure 1 shows the message-processing flow of a Mirth Connect channel.

The message-processing flow is divided into a series of steps between the source connector and the destination connector [6]. First, the raw messages flow into a source connector and are converted to XML through a pre-processor script. Then the data can be filtered or transformed, however the implementation of a filter and transformer is optional. Finally, the message needs to be encoded and sent to a destination connector.

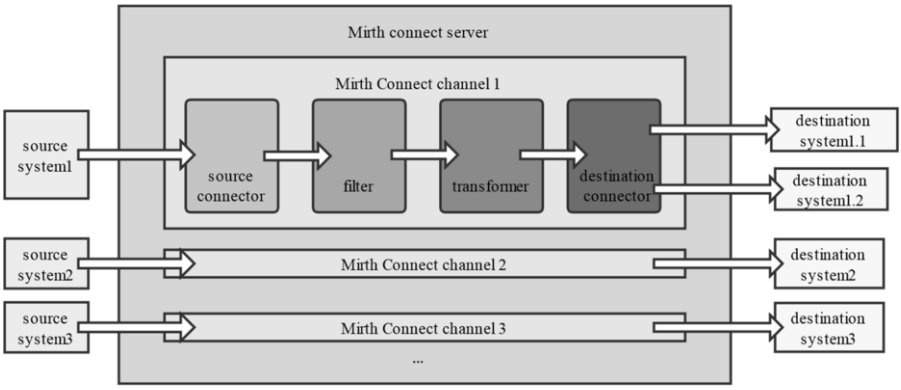

Figure 1. Messaging-process flow.

There can be multiple destination connectors and data can be filtered and transformed again before moving on to the destination system.

3. Case Study

Our clinic uses a custom EMR, the Vistacan Health System (VHS), that is integrated with the Veterans Health Information Systems and Technology Architecture (VistA). Clinicians can make appointments, view patient demographics and submit billing claims through Teleplan with VHS, but the system is fragmented. Clinical data exists both on a MySQL database for VHS and on VistA, with some fields not being shared. Billing options are also limited when third party insurance or cash is used. The EMR also served two separate locations, with limited features to support this. Additional maintenance and development costs to improve the system initiated the process to switch to an alternate EMR.

The most apparent problem with switching our EMR after several years of use was how to migrate the data between the old and new EMR. After exploring several options, it was apparent that most data migration services were going to be costly. We also had to consider which EMR would be most suitable for our clinic and the destination of said data. OpenEMR is a free open source electronic health record and medical practice management application [7]. Certain features like its Patient Portal, the web client, and support of file uploads were appealing (Figure 2). However, it was chosen primarily because of its open source nature and active development community [8]. This would allow us to customize the software to implement custom solutions.

We were in a unique situation where we had access to the source code and databases of the destination and source EMRs. The open source nature gave us the option to develop a data migration solution between the old and new EMR instead of using a third party. We decided to use Mirth Connect, which is also open source, as the primary

	VHS	OpenEMR
Open Source	YES	YES
Free	YES	YES
patient portal	YES	YES
Scheduling	YES	YES
File Upload	NO	YES
Web Client	NO	YES
development community	NO	YES

Figure 2. Features of VistA and OpenEMR.

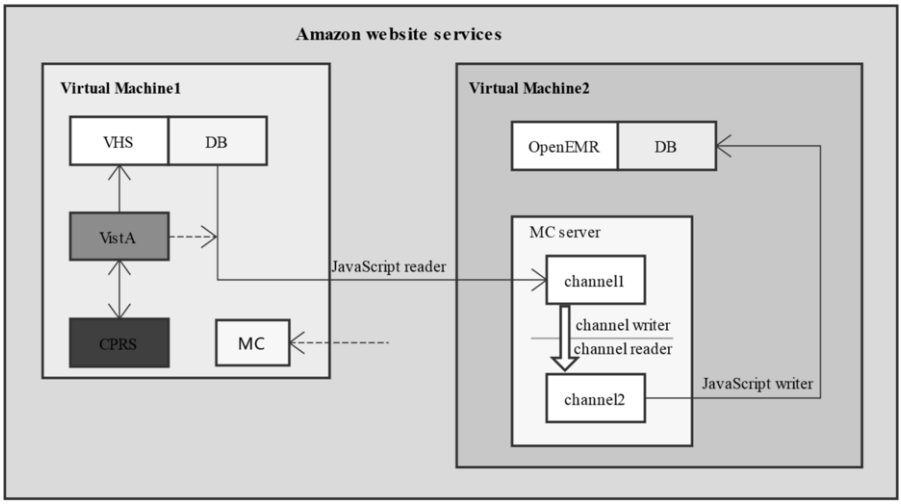

Figure 3. Data migration from VHS to OpenEMR.

method of data transfer. The most challenging part for our data migration was mapping the data points. Finding the proper source and destination of the data and the validation was also the most time consuming. Once the source and destination locations for the data was determined, all that was left was configuring the channels.

As shown in Figure 3, there are three channels deployed on the Mirth Connect server to migrate data from VHS to OpenEMR. The source system and destination system of channel1 is the database of VHS on VM1 and channel2 on VM2. The data extracted from VHS database is converted to XML through a pre-processor script and then is transformed to HL7 through a transformer. In this channel, the source connector type and destination connector type are JavaScript reader and channel writer. Channel2 connects channel1 and the database of channel2 so the processing steps were different in this transformer. In this transformer, the HL7 data from channel1 is written into the OpenEMR database rather than converted to another data type. Entering the data was as simple as writing a SQL command. The channels are deployed if data is updated or new data is added in VHS, allowing OpenEMR to have the most up to date information.

4. Conclusion

Changing EMRs can be a daunting task that requires the transfer of a lot of clinical data in order to make the switch. Sometimes clinics have no choice but to go with an EMR that offers data migration or use a third party service. However, there is an alternate solution for clinics that are small enough in scope that such an upgrade would be too costly. Choosing an open source EMR and using Mirth Connect as a data migration tool allows users to be in full control of the process. Mirth Connects' extensible architecture allows users to create their own plugins, connectors and extensions ensures that it can conform to the user's unique needs. Access to the database and schema of both the source and destination EMR is necessary but once this criteria is met the most challenging part

will be mapping the data between EMRs. After the initial data migration and successful move to the new EMR the channels were disabled but we believe Mirth Connect will be useful in future projects that require integration with other health information systems.

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